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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/251,592	02/17/1999	RANDALL W. ROBERTS	19210/106/10	3407

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SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A.
P.O. BOX 2938
MINNEAPOLIS, MN 55402

EXAMINER	
JACOBSON, TONY M	
ART UNIT	PAPER NUMBER
2644	

DATE MAILED: 03/25/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/251,592	ROBERTS ET AL.
	Examiner	**Art Unit**
	Tony M Jacobson	2644

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 03 September 2004.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-20 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-20 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 10 July 2003 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892) (2 pages)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3 September 2004 has been entered.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. **Claims 1-5, 8, 14, and 18** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "about 1.2 kilohertz " in **claims 1-5, 8, 14, 15, and 18** is a relative term which renders the claims indefinite. The term "about 1.2 kilohertz " is not defined by the claims, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. **Claims 1, 2, 6-8, and 11-18** are rejected under 35 U.S.C. 103(a) as being unpatentable over Martin et al. (US 5,710,820) in view of Sogn et al. (US 5,243,662), Smriga ('Exploring the Versatility of Three-Channel Programmability'), Trump and Stitt ('MFB Low-Pass Filter Design Program', Burr-Brown Application Bulletin AB-034B), Lacanette ('A Basic Introduction to Filters – Active, Passive, and Switched-Capacitor', National Semiconductor Application Note 779), Gennum Technical Paper: 'Active Filtering for Hearing Aids' ("Reference VV" hereinafter), and Trofimenkoff et al. ('Noise Performance of RC-Active Quadratic Filter Sections').

6. Regarding **claims 1, 2, 6-8, and 16-18**, Martin et al. discloses in Fig. 2 an electronic device for use in assisting a hearing impaired patient (a hearing aid), having a microphone (2), a preamp (3), a signal processing stage (4), and a class-D output amplifier (7), and further comprising a number of low-pass filters (part of 5) responsively coupled between the signal processing stage and the output amplifier. Martin et al. does not disclose that an active low-pass filter has an adjustable overshoot adapted to

tunably match a measured resonance curve to provide a substantially smooth insertion gain frequency response, said active filter including: a resistor coupled to a capacitor to form a low-pass filter to provide a filtered signal; an operational amplifier to receive the filtered signal at an input of the operational amplifier; a feedback capacitor coupled from an output of the operational amplifier to the input of the operational amplifier; and a variable resistor to couple the low-pass filter to the input of the operational amplifier, wherein said active low-pass filter is adapted to provide a frequency of peak gain of the electronic device at about 1.2 kilohertz. Sogn et al. discloses an electro-dynamic sound generator (speaker/receiver) for hearing aids that is constructed to provide a frequency response having a resonant peak (an "overshoot", as termed by Applicant) near the upper cutoff frequency of the sound generator response by mechano-acoustic means. Sogn et al. discloses at column 1, lines 60-67 that the resonant peak (overshoot) is provided to simulate the natural resonance of the ear canal that is lost upon insertion of a hearing aid. Smriga discloses at the last full paragraph of the first page that the peak location of a hearing instrument's frequency response should be adjusted according to the wearer's ear canal resonance peak to provide a flat insertion gain response. That the need to simulate ear-canal resonance in a hearing aid response to compensate for insertion loss was well known in the art at the time the present invention was made is further evidenced by "Advances in Programmable Canal Hearing Instrument Technology" by Agnew (e.g., at the first full paragraph of second page), provided by Applicant in the Information Disclosure Statement of 02 September 2003. Sogn et al. discloses at column 1, lines 40-43 that "The frequency and amplitude of the resonance

peak vary individually, but usually it is located within the range of 2 kHz to 4 kHz and has an amplitude of 10- 15 dB." Sogn et al. discloses at column 1, lines 43-49 that it is very important to provide a peak in the response of a hearing aid in this range in order to provide a perceived natural sound quality. Sogn et al. further discloses at column 1, lines 50-52 that "Electrical filtering of the input signal to the sound generator in a hearing aid may be used in order to restore the desired frequency response." Figure 3 of Sogn et al. illustrates the frequency response of the sound generator of the invention. One of ordinary skill in the art at the time the present invention was made would instantly recognize this as an under-damped low-pass filter response of approximately second-order. Finally, Sogn et al. discloses at column 4, lines 37-53 that due to individual variations in ear-canal resonance, it would be advantageous to provide a frequency response in a hearing aid that is adapted as closely as possible to a particular individual's natural ear-canal (meatus) resonance. Suggested solutions include manufacturing a series of sound generators, each having unique response characteristics, or implementing some form or other of resonance tuning. At the time the present invention was made, active filters were notoriously well known in the art as a superior solution for filtering low-level audio signals when the filter degree is greater than first order, with respect to passive electronic filters, because the inductors that would be required to implement second-order or higher passive filters at these frequencies are impractically large (Lacanette, page 15, Section 2.1); it was also notoriously well known to construct such filters utilizing IC (integrated circuit) operational amplifiers ("op-amps"), or sometimes, discrete transistors (Lacanette, page 15, Section

2.2). Many active-filter topologies were well known, as were methods for adapting (designing) them to meet particular filtering requirements. Trump and Stitt discloses at page 3, paragraph 3 ("COMPLEX POLE-PAIR CIRCUIT") that the two most commonly used op-amp pole pair (second-order low-pass) circuit topologies were the Multiple Feedback (MFB) and Sallen-Key topologies. Reference VV teaches the use of the MFB low-pass filter topology in hearing aids (Fig. 4) and cites as one advantage, the fact that MFB filters can be designed to provide gain in the passband of the filter, whereas non-inverting active filters usually have unity gain (page one, column 2, paragraph 3). The MFB-topology active low-pass filter, illustrated in Fig. 7 of Trump and Stitt includes: a resistor (R_1) coupled to a capacitor (C_2) to form a low-pass filter to provide a filtered signal (inherently); an operational amplifier (A_2) to receive the filtered signal at an input (-) of the operational amplifier; a feedback capacitor (C_1) coupled from an output of the operational amplifier to the input of the operational amplifier; and a "variable" resistor (R_3) to couple the low-pass filter to the input of the operational amplifier. (Any resistor in a circuit is "variable", as broadly as claimed and disclosed, in that its value may be varied [e.g., at the design or manufacturing stages] to achieve different desired results.) Further, assuming Applicant may have intended to indicate by "variable resistor" a single resistor that is adjustable so it can take on any of a plurality of resistance values within a specified range without requiring replacement of the resistor (i.e., a potentiometer), the courts have held that making something adjustable by employing known means, where there is an art-recognized need for adjustability, is not a patentable advance (see MPEP 2144.04 [V] [D.], In re Stevens, 212 F.2d 197, 101

USPQ 284 [CCPA 1954]). It was notoriously well known in the art at the time the present invention was made to provide adjustability in electronic circuits by substituting potentiometers for fixed-value resistors in a general design. It was also notoriously well known in the art at the time the present invention was made to set the resonant peak frequency of an under-damped low-pass filter at any required frequency within the audio frequency band (subject to the limitations of the particular op-amp, such as bandwidth and slew rate) by varying the values of the components. A number of computer software packages (such as the filter design program of Trump and Stitt) were widely available and used to determine suitable component values based on a required response curve, and manual active filter design methods were similarly well known. A simplified frequency domain analysis (assuming an ideal op-amp) of the circuit of Fig. 7 of Trump and Stitt leads to:

$$H(s) = \frac{V_O(s)}{V_I(s)} = \frac{-R_2}{s^2[C_2C_1R_1R_2R_3] + s[C_1(R_2R_3 + R_1R_3 + R_1R_2)] + R_1}.$$

This can be rearranged to a standard form of:

$$H(s) = \frac{H_0\omega_0^{\,2}}{s^2 + s\dfrac{\omega_0}{Q} + \omega_0^{\,2}} = \frac{\dfrac{-1}{C_2C_1R_1R_3}}{s^2 + s\dfrac{R_2R_3 + R_1R_3 + R_1R_2}{C_2R_1R_2R_3} + \dfrac{1}{C_2C_1R_2R_3}},$$

from which it can be determined that:

$$\omega_0 = \frac{1}{\sqrt{C_2 C_1 R_2 R_3}},$$

$$H_0 = -\frac{R_2}{R_1}, and$$

$$Q = \frac{R_1 \sqrt{C_2 C_1 R_2 R_3}}{C_1 \left(R_2 R_3 + R_1 R_3 + R_1 R_2\right)}.$$

In the above equations, *"ω_0"* is the corner (3-dB) frequency (in radians-per-second, 2π times the frequency in hertz), which is slightly greater than the frequency of peak response, depending on the value of "Q"; *"H_0"* is the DC (and low-frequency) gain; *"Q"* is the "quality factor", which determines the shape of the curve (i.e., the relative magnitude of the resonant peak – see Lacanette, page 9, final paragraph); and *"s"* is the complex frequency variable: $s = \sigma + j\omega$ (*"j"* representing the square root of negative one). Common knowledge in the art (i.e., a solid understanding of electrical engineering principles and methods, or a lesser understanding with the aid of well-known computer-aided design and simulation tools or filter design "cookbooks") allows one of ordinary skill in the art to analyze the effects of the values of the individual resistors and capacitors in the MFB active low-pass filter section. Sogn et al. discloses that the frequency and amplitude of the resonance peak vary individually (among different patients). One of ordinary skill would recognize that it is desirable to adjust the frequency and the amplitude of the filter's resonant peak without altering the DC or low-frequency gain, as this would make an adjustment process more difficult. As shown by the third equation above, the corner frequency (ω_0) depends equally on the values of

C_2, C_1, R_2, and R_3 (equivalent to [C]32, [C]40, [R]34, and [R]36, respectively in Applicant's Fig. 4). Because practical adjustable capacitors for use at audio frequencies are not generally known, while adjustable resistors are widely known and used at audio frequencies, either R_2 ([R]34) or R_3 ([R]36), or both, should be adjusted to vary the resonant frequency. An important characteristic of an active filter is the input impedance, which must be large enough to prevent excessive loading of the previous circuit stage, while not being so large as to cause substantially increased noise (see Trofimenkoff et al., page 527). Trofimenkoff, et al. teaches at Fig. 4 (text) that the input impedance of the MFB low-pass filter is determined predominantly by the value of the input resistor R_1 ([R]30 in Applicant's Fig. 4); thus, a particular value may be dictated by the loading requirements of the preceding circuit stage and/or noise considerations. Since the DC gain (H_0) is determined by the ratio of R_2 ([R]34) to R_1 ([R]30), the value of R_2 ([R]34) should not be changed by a frequency adjustment (unless it is arranged to change both R_2 ([R]34) and R_1 ([R]30) in a coordinated manner so that the ratio of their adjusted values remains constant as both their values are changed – a complex arrangement that will also alter the input impedance as the resistances are adjusted). Accordingly, one is lead in a relatively obvious manner to make R_3 (36 in Applicant's Fig. 4) adjustable to vary the frequency of the resonant peak of the active low-pass filter. The analysis above is based on the application of basic engineering principles to a problem that is well defined in the prior art, and thus does not require the exercise of any inventive process. Although Martin et al. discloses generally that the filters of filter stage 5 are switched-capacitor filters that are programmably adjustable, one of ordinary

skill in the art at the time the invention was made would have recognized that basic R-C active filters (an art-recognized equivalent – see section 2.3 at page 15 of Lacanette) could be substituted to provide the basic functionality in a simpler but less flexible fixed or semi-fixed filtering implementation, and that this would allow elimination of anti-aliasing filter 25 and smoothing filter 26 of Fig. 2. Thus, it would have been obvious to one of ordinary skill in the art at the time the present invention was made to include a well-known under-damped second-order low-pass filter, such as the MFB-topology according to the general teachings of Trump and Stitt, Lacanette, Reference VV, and Trofimenkoff et al., in the filter stage (5) of a hearing aid constructed according to the general teachings of Martin et al. (comprising equivalent or similar functional blocks), with the peak resonance frequency of the low-pass filter adjustable as described above to match the natural open-ear resonance frequency of a patient according to the teachings of Sogn et al. Although none of the references cited above specifically states that the active low-pass filter is adapted to provide a frequency of peak gain of the electronic device at "about 1.2 kilohertz", since the ear's response to frequency is logarithmic, "about 1.2 kHz" could be interpreted as a range as wide as 600 Hz to 2.4 kHz (an octave above and below 1.2 kHz, respectively) or even wider – Applicant has provided no standard for determining the scope of such a limitation; analysis and simulation of Applicant's circuit of Fig. 4 shows that the disclosed invention can be adjusted to have a substantially similar overall frequency response curve shape with the resonant peak scaled to anywhere between approximately 1 kHz and 3 kHz by adjustment of variable resistor 36, which suggests a wide range is intended. Sogn et al.

discloses at column 1, lines 40-41 that "The frequency and amplitude of resonance peak vary individually" (among patients) and at column 4, lines 39-43 that "When the sound generator is to be used in a hearing aid it is hence of course an advantage that the sound frequency response of the sound generator to the largest degree possible is adapted to the natural acoustic transfer function of [t]he user's meatus"; and Smriga teaches at the last full paragraph of the first page, "When the wearer's ear canal resonance peak is known, the dispenser can adjust the peak location of the instrument's frequency response to maximize the likelihood of obtaining a flat insertion gain response." In view of these teachings, it would have been obvious to one of ordinary skill in the art at the time the present invention was made to adapt the active low-pass filter to provide a frequency of peak gain at whatever frequency the patient's natural ear-canal (meatus) resonance occurs, based on open-ear resonance (REUR) measurements according to common practice in the art. In designing an active low-pass filter that is to be adjustable to allow such adaptation without modification or custom manufacturing, it would have been obvious to one of ordinary skill in the art to make the resonant frequency adjustable to cover the full range of ear-canal resonances observed among the population, or to provide a series of hearing aids, each adjustable over a portion of the overall observed range according to the teachings of Sogn et al., as described above.

7. Regarding **claims 11-14**, the inherent method of operating the hearing aid arranged according to the general teachings of Martin et al., modified as described above with regard to claims 1, 2, 6-8, and 16-18, would be as claimed, according to the teachings recited above.

8. Regarding **claim 15**, adjustment of the resonant peak frequency in the hearing aid arranged according to the general teachings of Martin et al., modified as described above with regard to claims 1, 2, 6-8, and 16-18, would inherently further comprise adjusting "an amplification of an overshoot" of said active low-pass filter (to the same extent [i.e., incidentally] as enabled by Applicant's disclosure), as shown by the dependence on the value of variable resistor R_3 in the equation for "Q" (which determines the relative amplitude of the resonant peak) provided above with regard to claims 1, 2, 6-8, and 16-18. Applicant has not disclosed any particular scheme behind the way that the relative amplitude of the resonant peak varies with the adjustment of the resonant peak frequency; analysis and simulation of Applicant's circuit of Fig. 4 shows that the amplitude of the peak varies only by about 1 dB as the resonant peak is adjusted from about 1 kHz to nearly 3 kHz, having a peak value of about 15.7 dB, relative to the DC gain, when R_{36} is adjusted near midrange, corresponding to a peak resonance at about 1.6 kHz; and Applicant has not disclosed in an enabling manner any other method of adjusting the amplitude ("an amplification") of the resonant peak.

9. **Claims 3-5, 9, 10, 19, and 20** are rejected under 35 U.S.C. 103(a) as being unpatentable over Martin et al. (US 5,710,820) in view of Sogn et al. (US 5,243,662), Smriga ('Exploring the Versatility of Three-Channel Programmability'), Trump and Stitt ('MFB Low-Pass Filter Design Program', Burr-Brown Application Bulletin AB-034B), Lacanette ('A Basic Introduction to Filters – Active, Passive, and Switched-Capacitor', National Semiconductor Application Note 779), Gennum Technical Paper: 'Active Filtering for Hearing Aids' ("Reference VV" hereinafter), and Trofimenkoff et al. ('Noise Performance of RC-Active Quadratic Filter Sections') as applied to claims 3 and 4 above, and further in view of Gennum Application Note: 'How to Use the LS509 based GS3010 Hybrid' ("Reference UU" hereinafter) and Gennum Application Note: 'GL504-GH580, GK504-GH580' ("Reference XX" hereinafter).

10. Regarding **claims 3, 5, 9, 19, and 20**, it was well known in the art at the time the present invention was made to implement an active first-order high-pass filter by connecting a resistor and capacitor in series between a signal source (e.g., a preceding amplifier or filter stage) and an inverting input of an op-amp, with a feedback resistor connected between the output of the op-amp and the inverting input, as illustrated in Applicant's Fig. 4 (elements 44, 46, 48, and 50) and in accordance with the limitations of these claims. In such a first-order active high-pass filter, the operational amplifier could be characterized as a "buffer" (as Applicant has done), because that is essentially its purpose – it prevents the following circuitry from affecting the characteristics of the R-C

filter as would occur when any substantial load is applied to a purely passive R-C filter. It was also notoriously well known to provide a high-pass filter in the filtering chain of a hearing aid to eliminate extremely low frequency signal components, as the extreme lower portion of the audio spectrum is known to consist primarily of noise and little essential speech information. Martin et al. includes such a "bass reduction filter" (23) in the hearing aid of Fig. 4. Reference UU discloses a hybrid integrated circuit (Gennum GS3010), including a popular inverting amplifier integrated circuit amplifier IC (Gennum LS509) and a number of resistors and capacitors, for use in hearing aids or other applications. Figure 1 illustrates a typical application of the GS3010 hybrid IC in a hearing aid in which the output of a first amplifier stage is coupled to a second stage by a "coupling capacitor and coupling resistor connected in series" (and built into the hybrid IC). Reference UU discloses at page 1, column 1, paragraph 5 that the 47-nF input capacitor (C2) in combination with the 3.9-kΩ internal resistance of the microphone establishes a corner frequency of 868 Hz at the input of the first amplifier stage (A). Although not explicitly disclosed, one of ordinary skill in the art would also recognize that resistor R3, in series combination with capacitor C3, coupling the output of the first amplifier stage (A) to the inverting input of the second amplifier stage (B) produces a (high-pass) corner frequency at 605 Hz in the same manner. Reference XX describes an arrangement comprising a Gennum GL504 or GK504 class-D preamplifier IC (preamplifier IC for driving an integrated class-D receiver) in combination with a Gennum GH580 adjustable second-order high-pass filter IC. Figs. 14 and 15 show the output of the GH508 active filter coupled to the input of amplifier "B" of the GK504

preamplifier IC through the series combination of a 0.1-μF capacitor (C3) and a 10-kΩ resistor – the same values shown for capacitor 44 and resistor 46, respectively, in Applicant's Fig. 4, and which will produce an identical first-order high-pass response with a corner frequency of 159 Hz, regardless of the value of the feedback resistor. Reference XX explains the effect of this arrangement at the second paragraph of page 10. It would have been obvious to one of ordinary skill in the art at the time the present invention was made to place the adjustable under-damped MFB low-pass filter described above at any point in the chain of filters of filter stage 5 in a hearing aid arranged according to the general teachings of Martin et al., such as immediately preceding bass reduction filter 23, and further to implement bass reduction filter 23 as described above, as a "buffer stage", having its input signal coupled from the output of the adjustable under-damped MFB low-pass filter by a coupling capacitor and coupling resistor connected in series, according to the well-known first-order active high-pass filter arrangement demonstrated by References UU and XX as described above, because the order of performing these filtering operations makes no functional difference, as would have been recognized by one of ordinary skill in the art.

11. Regarding **claim 4**, as described above regarding claim 1, Sogn et al. and Smriga teach providing a peak in the frequency response of a hearing aid to match the natural ear canal resonance of a patient; thus, it would have been obvious to one of ordinary skill in the art at the time the present invention was made to use a resonance curve of an outer auditory canal of a hearing impaired patient as the measured

resonance curve on which to base the adjustment of the under-damped MFB-topology low-pass filter in a hearing aid arranged according to the general teachings of Martin et al., modified as described above with regard to claims 1-3, according to this widespread teaching in order to provide the associated benefits (e.g., a natural sound) taught in these references.

12. Regarding **claim 10**, it was notoriously well known at the time the present invention was made to couple signals between signal processing (e.g., amplifying and filtering) stages by capacitors for various reasons, including to block undesired DC components, to provide a high-pass filtering response (as described above regarding claim 9), or to allow interconnection of circuit points having mutually different bias voltages. This is demonstrated by capacitors C3 and C4 of Fig. 5 of Reference XX. Applicant has not disclosed any new or unexpected result from (or even a reason for) inclusion of such a coupling capacitor in the present invention. It would have obvious to one of ordinary skill in the art at the time the present invention was made to capacitively couple the output amplifier to the "buffering" (filter) stage in a hearing aid arranged according to the general teachings of Martin et al., modified as described above according to common practice in the art.

Response to Arguments

13. Applicant's arguments with respect to **claims 1-20** have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

15. 'Low Current Quad Inverting Amplifiers – LX509 Data Sheet' ("Reference WW") discloses in Fig. 3d a filtering implementation of a second-order MFB-topology low-pass filter in a hearing aid, in which the filter output is coupled to a buffer amplifier by a coupling capacitor and resistor connected in series. While this revision of the document was published after Applicant's filing date, page 4 indicates that the revision only involved new standard packaging information, and that the original version was published in 1988.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tony M Jacobson whose telephone number is 703-305-5532. The examiner can normally be reached on M-F 11:00-7:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sinh N Tran can be reached on 703-305-4386. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

tmj
February 24, 2005

SINH TRAN
SUPERVISORY PATENT EXAMINER